

The World Market for Natural Gas and Gas Flow Measurement, 3rd Edition

Overviews of the *Core Study* and *Module C*

The World Market
for Gas Flow
Measurement,
3rd Edition
CORE STUDY

MODULE C:
The World Market for
Custody Transfer of
Natural Gas



*CEESI High-pressure Gas Calibration Facility
Photo by Flow Research*



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The World Market for Natural Gas and Gas Flow Measurement, 3rd Edition

The World Market for Natural Gas and Gas Flow Measurement is a set of studies made up of a base study and four associated modules. The *Core Study* provides a worldwide view of the gas flow measurement market and serves as the basis for the other reports. As a group, these studies provide the most comprehensive picture of the worldwide gas flow market available today.

The research in the modules complements and builds on the detailed results of the *Core Study*. These modules show where growth is occurring and where it is not, and where to expect the highest returns. Strategies for succeeding in regional and worldwide markets are provided, along with descriptions of industries and applications that are keys to understanding a complex market.

Flow Research has been following the natural gas flow market regularly since the publication of the first edition of our worldwide gas flow measurement study in 2004. We have conducted user interviews that show that the interest in natural gas flow measurement remains at a very high level. Our objective is to provide you the information you need to make informed decisions in pursuing new business and higher returns in this market.

This modular study set achieves multiple goals:

- Determines worldwide supplier market size for natural gas flow measurement in 2014 for each technology type
- Forecasts market growth through 2019 for all nine flow technologies used in this market
- Identifies the industries and applications where natural gas flow measurement is used and provide shipments by application and industry
- Identifies market growth sectors
- Creates company and country profiles of the main suppliers into the natural gas flow measurement market as well as the main natural gas providers throughout the world, with a special focus on the Mideast
- Analyzes the products of the major companies selling into the natural gas flow measurement market
- Provides average selling prices in this market worldwide and by individual region
- Analyzes the custody transfer market for natural gas in depth
- Offers strategies to manufacturers for selling into the natural gas flow measurement market

The World Market for Natural Gas and Gas Flow Measurement

The *Core Study* examines gas flowmeters worldwide and by region by individual technology type.

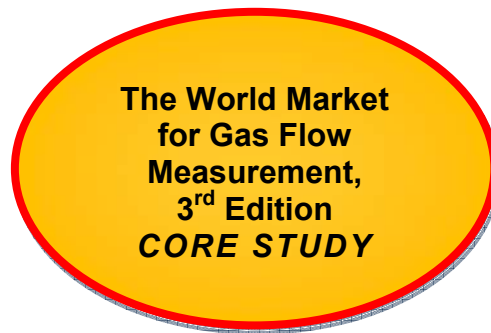
Module A looks at the worldwide market by geographic region, then follows with in depth coverage of each individual region including major countries and suppliers.

Module B is wholly dedicated to coverage of the Mideast/Africa region, with regional and country-by-country data on flowmeter usage and the gas markets there.

Module C covers the worldwide market for custody transfer of natural gas.

Module D covers supplier strategies, industries, and end-user applications.

The *Core Study* and *Modules A, B, C, and D* can be individually ordered as standalone reports.



Core Study

The World Market for Gas Flow Measurement, 3rd Edition

Date of Publication: February 2016

Introduction

The worldwide natural gas market has experienced extraordinary growth over the last decade, and with this growth has come exceptional interest in its future. The global search for new sources of energy has been spurred on by the emergence of major new demands placed on energy supplies by China, India, and other developing economies. Natural gas has become an important answer to the question, “How will these new energy demands be satisfied?”

Natural gas availability has been boosted by recent discoveries of new gas fields and new methods of production. While gas exploration has been an on-going process, gas production has been experiencing a revolution due to new extraction technologies having been brought on line. These technologies not only increase the volume of natural gas available to the market, but increase the complexity of its management as well.

The production of natural gas is still found primarily in traditional land-based locations, but increasingly the growth in production has been at offshore and subsea locations. These latter fixed sites have required the use of pipeline-sharing and other evolving technologies. And, most recently, gas production has begun to include the use of floating LNG ships. These many innovations have constantly stretched and tested the limits of gas flow measurement applications, and created an increased demand for gas flow measurement as well.

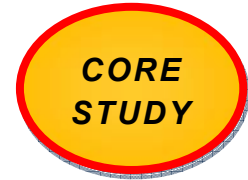
The seeming abundance of natural gas has been welcomed by the world community for several major reasons. First, of course, is that it can help to meet the energy needs of every country and is available now. Second, it is currently at a favorable price point due to its surging supply. Third, it can be delivered in a number of forms and through a variety of means, making it a highly versatile commodity and potentially lowering its cost of distribution. And, fourth, natural gas is considered a relatively clean alternative to crude oil and petroleum fuels – an important factor in a world becoming convinced of the need to implement environmental protections now.

Flow Research believes there’s never been a better time to quantify the growth in the gas flow measurement market, and to provide an in-depth look at its present and future prospects.

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Core Study Objectives

This 3rd Edition of this study continues our analysis of the worldwide gas flow measurement market we began in 2004. There has been an enormous amount of change during this time, from both a technology standpoint and a corporate perspective.



Natural gas – traditionally a major source of energy for the entire world – is now an even more valued commodity that offers a cleaner and more economical alternative to oil. New technology is making recovery and delivery of natural gas more feasible than ever before, even from subsea wells. Newly developed natural gas reserves in North America and elsewhere are making it possible for Western countries to be less dependent on foreign suppliers.

The above changes are helping to create a world much different than just five years ago. Gas trade routes are substantially changing as the demand for natural gas is met by a rapid increase in LNG supplies. What were once emerging regional economies in China and India are now leaders among nations in natural gas utilization. The United States is actually becoming an exporter of natural gas. And, many wonder in what form the gas industry will be sustained given today's gas prices and market volatility.

The *Core Study* describes in detail the effects the above dynamics and other factors have had on the gas flowmeter market since our last full report on the subject in 2011. This report is the most comprehensive and up-to-date review of the gas flowmeter market available today.

The highlights of the *Core Study* are summarized below:

- Determine worldwide market size for gas flow measurement in 2014
- Determine worldwide market shares for the gas flow measurement market in 2014
- Forecast market growth through 2019 for all nine flow technologies used in this market
- Identify market growth sectors
- Create company profiles of the main suppliers into the gas flow measurement market
- Analyze products for the main companies selling into the gas flow measurement market
- Provide product descriptions and average selling prices in this market
- Analyze factors contributing to and limiting growth

This study examines the world gas flowmeter market as divided below:

Geographic Regions

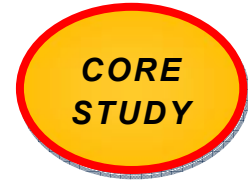
- Worldwide
- North America
- Western Europe
- Eastern Europe/FSU
- Mideast/Africa
- Japan
- China
- Asia/Pacific
- Latin America

Flowmeter Technologies

- Coriolis
- Ultrasonic
- Vortex
- Thermal
- Differential Pressure Transmitters
- Primary Elements
- Positive Displacement
- Turbine
- Variable Area

Seventeen Chapters of In-depth Market Analysis

Each flowmeter technology included in the *Core Study* is comprehensively reviewed. Each of the nine dedicated technology chapters includes discussions of advantages and disadvantages of the subject flowmeter type. The specific products offered by leading manufacturers are detailed, including technical reviews that include material types, line sizes, accuracy levels and other distinguishing data.



Of special note is that we are now including the comments provided by respondents to our worldwide survey of product and technology managers. These insights are another way to develop a more refined worldwide view of each flowmeter technology and its place in the market.

The Market Size for each gas flowmeter type is provided, as is the five year Growth Forecast. All of this data is presented both on a worldwide basis as well as broken down by the eight geographic regions.

Average Selling Prices for each gas flowmeter type are also provided on a worldwide basis as well as by the eight geographic regions.

Care has been taken to ensure that a consistent research methodology was used in the collection of data and in its subsequent presentation throughout the study itself. We believe this consistency facilitates the use of the study findings.

Below is a brief summary of the contents of each chapter in the *Core Study*. Samples of the many comments and growth factors are included for each technology chapter.

Chapter 1: Executive Summary

- Introduction and summary capturing major themes, data, and conclusions

Chapter 2: Scope and Method

- Overviews of study objectives and methodology
- Definitions of flowmeter technologies
- Overview of Flow Research products and services

Chapter 3: Paradigm Case Analysis

- The ideal applications for each gas flowmeter technology are reviewed and discussed

Chapter 4: The Worldwide Gas Flowmeter Market

- Natural Gas is a cleaner alternative
- Natural Gas projected to continue to grow despite today's low prices
- Individual gas flowmeter technology overviews
- Market Size and Growth Forecasts for All Gas Flowmeters by Type Worldwide
 - In Dollars
 - In Units

Chapter 5: New-Technology Gas Flowmeters

- Growth factors and market circumstances are provided and discussed for each of the new-technology gas flowmeters
- Work on developing a “magic bullet” technology will result in new products and methods of measuring gas flow
- Shipments of New-technology Gas Flowmeters by Flowmeter Type Worldwide:
 - o In Dollars
 - o In Units

**Chapter 6: Coriolis Gas Flow Products, Market Size, and Forecasts**

- Advantages – Accuracy – and more
- Product analyses of leading companies such as Micro Motion and Endress+Hauser
- Comments – “Smaller installation envelope, no need of straight inlet and outlet runs”
- Growth Factors – ‘Best-in-class’ accuracy now available in large line sizes.
- Market Size and 5-year Market Growth Forecasts on a worldwide and regional basis
- Average Selling Prices worldwide and by region

Chapter 7: Ultrasonic Gas Flow Products, Market Size, and Forecasts

- Advantages – Approved for custody transfer – and more
- Product analyses of leading companies such as Elster and SICK
- Comments – “New generations of product deciders are appearing”
- Growth Factors – More calibration facilities have been built
- Market Size and 5-year Market Growth Forecasts on a worldwide and regional basis
- Average Selling Prices worldwide and by region

Chapter 8: Vortex Gas Flow Products, Market Size, and Forecasts

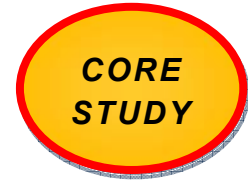
- Advantages – Multivariable types provide mass flow measurement – and more
- Product analyses of leading companies such as azbil and Sierra Instruments
- Comments – “The ability to handle high pressure and high velocity gas flows.”
- Growth Factors – Provide accurate and reliable flow measurement at a competitive price
- Market Size and 5-year Market Growth Forecasts on a worldwide and regional basis
- Average Selling Prices worldwide and by region

Chapter 9: Thermal Gas Flow Products, Market Size, and Forecasts

- Advantages – Well-suited for stack flow measurement – and more
- Product analyses of leading companies such as ABB and Fluid Components International
- Comments – “Flare gas regulations will eventually be enforced”
- Growth Factors – Continuous Emissions Monitoring requirements
- Market Size and 5-year Market Growth Forecasts on a worldwide and regional basis
- Average Selling Prices worldwide and by region

Chapter 10: Traditional Technology Gas Flowmeters

- Growth factors and market circumstances are provided and discussed for each of the traditional technology gas flowmeter types
- Discussion of factors applying to all traditional technologies
 - Large installed bases
 - Industrial approvals
- Shipments of Traditional Technology Gas Flowmeters by Flowmeter Type Worldwide
 - In Dollars
 - In Units



Chapter 11: Differential Pressure Gas Flow Products, Market Size, and Forecasts

- Advantages – Technology is well understood – and more
- Product analyses of leading companies such as Emerson-Rosemount and Siemens
- Comments – “New markets are opening to pressure measurement, e.g., thermo solar.”
- Growth Factors – Advanced features in differential pressure flow transmitters
- Market Size and 5-year Market Growth Forecasts on a worldwide and regional basis.
- Average Selling Prices worldwide and by region

Chapter 12: Primary Elements Used in Gas Flow Products, Market Size, and Forecasts

- Advantages – Variety of types – and more
- Product analyses of leading companies such as Emerson-Daniel and Cameron
- Comments – “Proven system/simple system/low pressure loss with better transmitters”
- Growth Factors – Growth in the use of multivariable DP flowmeters
- Market Size and 5-year Market Growth Forecasts on a worldwide and regional basis.
- Average Selling Prices worldwide and by region

Chapter 13: Positive Displacement Gas Flow Products, Market Size, and Forecasts

- Advantages – Accommodate high viscosities – and more
- Product analyses of leading companies such as Elster and GE-Dresser
- Comments – “Distribution network is built up in countries like China, India, etc.”
- Growth Factors – New applications and improved PD components
- Market Size and 5-year Market Growth Forecasts on a worldwide and regional basis.
- Average Selling Prices worldwide and by region

Chapter 14: Turbine Gas Flow Products, Market Size, and Forecasts

- Advantages – Low to medium cost – and more
- Product analyses of leading companies such as Emerson-Daniel and Hoffer Flow Controls
- Comments – “Dual rotor offers improved performance and a very small footprint”
- Growth Factors – Turbine flowmeters are widely accepted
- Market Size and 5-year Market Growth Forecasts on a worldwide and regional basis.
- Average Selling Prices worldwide and by region

Chapter 15: Variable Area Gas Flow Products, Market Size, and Forecasts



- Advantages – Don't require electricity – and more
- Product analyses of leading companies such as KROHNE and Yokogawa
- Comments – “Simple mechanical flow indicator, best fit solution for low flows”
- Growth Factors – Variable area flowmeters are a low-cost solution
- Market Size and 5-year Market Growth Forecasts on a worldwide and regional basis
- Average Selling Prices worldwide and by region

Chapter 16: Gas Flowmeter Supplier Market Shares

- Market shares are provided for the total worldwide market for each flow technology

Chapter 17: Supplier Profiles

- Provides information on all major gas flowmeter suppliers worldwide, including:
 - o Company overview
 - o Company history and organization
 - o Product lines
 - o Strategies

Company Profiles

Complete company profiles on the leading gas flowmeter suppliers are included.

The following is a list of companies profiled in this study:

- | | |
|--|--------------------------------------|
| • ABB | • GE Measurement & Control (Dresser) |
| • Aichi Tokei Denki | • Hoffer Flow Controls |
| • AMETEK (Solartron) | • Honeywell (RMG) |
| • azbil (formerly Yamatake) | • KROHNE |
| • Cameron | • Schneider Electric (Foxboro) |
| • Canalta Controls | • Sensus |
| • Elster Group | • SICK AG |
| • Emerson (Bristol, Daniel, Micro Motion, Rosemount) | • Siemens |
| • Endress+Hauser | • Sierra Instruments |
| • Fluid Component International | • SMAR Equipamentos |
| • FMC Technologies | • TMCo (The Measurement Company) |
| | • Yokogawa |

**Key Issues Addressed in
The World Market for Natural Gas and Gas Flow Measurement, 3rd Edition**

The Core Study and Modules A through D address the following key issues:

- What is the technological state of the market today?
- Which applications are growing – and which are not?
- What regions of the world hold the greatest growth prospects – and why?
- Are there new competing technologies to the traditional devices – and what are they?
- What is the current breakdown in use between insertion and inline device types?
- Are there new gas flow measurement standards that must be understood?
- What are the features that end-users are looking for in gas flow measurement?

How it all began — The idea for this series of studies started with three visits I made to the Mideast. My goal was to interview oil and natural gas producers to understand what types of flowmeters



Dr. Jesse Yoder on the road to Dubai

they were using, what flowmeter types they were planning to buy, and what projects were upcoming.

I completed 15 interviews in Saudi Arabia, the UAE, Oman, and Qatar. During these interviews I realized how important it is to understand the natural gas producers in order to really grasp the gas flowmeter market. These are the companies that set the trends with their buying decisions and their massive projects.

Generalize this insight to the whole world, and you have Module A. Module B focuses specifically on Mideast/Africa and shares business strategies I learned from my trip.

The Core Study and Module C are just as insightful. These two studies combine to provide a real understanding of the total worldwide gas flowmeter market – where it is today, and where it is going tomorrow.

– *Dr. Jesse Yoder, President,
Flow Research, Inc.*



Module C:

The World Market for Custody Transfer of Natural Gas

Date of Publication: October 2015

Flow Research is excited about the new edition of our study, *The World Market for Custody Transfer of Natural Gas*. The first edition was immediately popular. This new edition builds on the knowledge gained in the first edition, and covers recent developments as well.

Highlights of Module C:

- Determines worldwide market size and market shares for custody transfer of natural gas in 2014
- Forecasts market growth for each type of natural gas custody transfer flowmeters through 2019
- Identifies the industries and applications where natural gas custody transfer flowmeters are used, as well as market growth sectors
- Analyzes the products of the main companies selling into the natural gas custody transfer flowmeter market
- Provides strategies to manufacturers for selling into this growing flowmeter market
- Profiles the main suppliers of natural gas custody transfer flowmeters

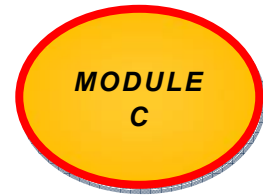
Consumption of Natural Gas Rising Fast

The demand for natural gas is increasing substantially. According to the US Department of Energy's Energy Information Administration (EIA), consumption of natural gas is expected to grow significantly through 2016 and beyond. Custody transfer is obviously one of the most integral steps in the supplier-to-consumer process chain. Natural gas changes hands, or ownership, at a number of points between the producer and the end-user. These transfers occur at custody transfer points, and are tightly regulated by standards groups such as the American Gas Association (AGA). Other geographic regions have their own regulatory bodies. There are several flowmeter technologies in this market: some are well-established, whereas others are emerging.

New-technology flowmeters such as Coriolis and ultrasonic offer increased reliability, reduced pressure drop, and high accuracy. At the same time, suppliers are making improvements to the traditional technology meters, improving their performance. Turbine flowmeters are being made with more durable bearings, offering longer life. And improvements in pressure transmitters mean greater stability and accuracy when they are used to make pressure or flow measurements.

An optimal time to quantify the gas custody transfer flowmeter market

This was an ideal time to have analyzed the existing size and future growth in the custody transfer flowmeter market. We have taken an in-depth look at the new technologies, manufacturers, and applications in one of the fastest growing markets in the worldwide flowmeter industry.



Module C provides:

- 2014 market data on Coriolis, ultrasonic, differential pressure (DP), and turbine flowmeters used for natural gas custody transfer applications
- A custody transfer product analysis for each flowmeter type
- Growth factors for each type of flowmeter
- Shipments by geographic region, including revenues and units
- Market shares worldwide and by geographic region for each flowmeter type
- Comparison of flowmeter types used in natural gas custody transfer
- Flowmeter market growth projections through 2019

In conducting this study, we contacted all known manufacturers of natural gas custody transfer flowmeters worldwide. Flow Research has identified recent entrants into this growing market. With profiles of companies and products, we have assembled a comprehensive picture of the total natural gas custody transfer flowmeter market.

We asked suppliers to provide detailed information about geographic segmentation, industries sold into, types of flowmeters sold, and many other product segments. As a result, the study identifies where growth is occurring in the market, as well as the underlying factors for that growth. Our end-users survey provides additional perspectives on this market.

Company Profiles

Complete company profiles of the leading gas custody transfer flowmeter suppliers are included. The following is a list of companies profiled in this study:

- | | |
|---|--------------------------------------|
| • ABB Automation Products | • GE Measurement & Control (Dresser) |
| • AMETEK (Solartron) | • Hoffer Flow Controls |
| • azbil (formerly Yamatake) | • Honeywell (RMG) |
| • Cameron | • KROHNE |
| • Canalta Controls | • Schneider Electric (Foxboro) |
| • Elster Group (now Honeywell) | • SICK AG |
| • Emerson (Bristol, Daniel,
Micro Motion, Rosemount) | • Siemens |
| • Endress+Hauser | • SMAR Equipamentos |
| • FMC Technologies | • TMC Co (The Measurement Company) |
| | • Yokogawa |



Blaise Pascal



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The Flow Research *Founding Sponsor Program*

To produce studies that most closely match our clients' needs, Flow Research instituted the Founding Sponsor Program. This program enables companies who wish to participate at a high level in a study's research to influence its scope and segmentation. In addition, Founding Sponsors receive regular updates from Flow Research on study progress, and receive a significant discount on the regular price of the study.

Procedure: Early in the planning phase of a study, Founding Sponsors receive a proposal that includes the proposed segmentation. Founding Sponsors can propose additional segmentation, and can also suggest changes to the proposed segmentation. While the decision to adopt particular segmentation ultimately lies with Flow Research, and is based on input from all contributors, we will do our best to accommodate the specific needs of each of our clients.

During the research phase of a study, Flow Research will issue regular reports that provide updates on the progress of the research. These reports will be sent to Founding Sponsors, who are then invited to provide any additional input or comments into the study.

Being a Founding Sponsor requires making an early commitment to purchase the study. However, in return, Founding Sponsors receive a significant discount off the regular price of the study. Payment can be made either in one amount at the beginning of the study, or split into two, with the second payment due upon delivery of the study.

For additional details, or to find out how the Founding Sponsor program applies to any particular study, please contact Flow Research. We look forward to working with you!

If you have any questions about the Founding Sponsor program, please contact Norm Weeks at +1 781 245-3200, or norm@flowresearch.com.

Flow Research



Dr. Jesse Yoder is President of Flow Research Inc., a company he founded in 1998 and the only market research company whose primary mission is to research flowmeter, calibration, level device, and other process control instrumentation markets. Dr. Yoder has 28 years of experience as a writer and analyst in process control and instrumentation. Since 1990, he has written more than 180 market research studies, most of them about flow and instrumentation. Information about Flow Research studies can be found at www.flowstudies.com or the specific websites in the studies list below. Dr. Yoder has written more than 240 articles on flow and instrumentation for trade journals. Links to many of these can be found at www.flowarticles.com. He has also authored two books. [Shades of Experience](#) includes a discussion of viewpoint pluralism. [The Tao of Measurement](#), coauthored with Dick Morley, and published by the ISA, deals with the past, present, and future of flow, sensors, and measurement. Dr. Yoder holds a patent for a new type of flowmeter. He started the Flowmeter Recalibration Working Group (www.frwg.org). The purpose of this group is to arrive at a group of criteria that end-users can employ to determine if their flowmeters need to be recalibrated.



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Belinda Burum, Vice President, worked in high tech for 16 years as a writer and marketing communications manager. She joined Flow Research in 2002, and has worked on many projects.

Norm Weeks, Senior Market Analyst, joined Flow Research in 2004. His contributions in development, research and writing are significant, including involvement with studies, custom projects, White Papers, and the Worldflow quarterlies, *Energy Monitor* and *Market Barometer*.

Leslie Buchanan, Research Assistant and Publication Production Associate, joined Flow Research in 2010. At first working with the database, outreach and publication formats, she has become involved in many capacities with our studies, Worldflow and other publications.

Nicole Riordan, Executive Assistant and Marketing Assistant, joined Flow Research in 2009. She capably handles a wide variety of essential office functions, and also assists with our marketing and direct outreach efforts.

Victoria Tuck, Administrative Assistant, joined Flow Research in June, 2012. She assists with administrative and other tasks, including database, outreach, and the Worldflow publications.

Christina Glaser, Website Maintenance and Research Assistant, joined Flow Research in 2010. In addition to general assistance, she took on the major role of refreshing, improving and maintaining our many company websites.

Rich West, Database and Research Assistant, joined Flow Research in 2014. He works with our database and outreach, assisting with customer liaison, and providing input and updates to manufacturer databases that are maintained for a variety of research purposes.

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OMAN Gas Company
Photo by Flow Research



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Why Flow Research?

- We specialize in flowmeter markets and technologies.
- We have researched all flowmeter types.
- We have interviewed gas flow end-users onsite in many countries.
- We have more than ten years of historical data on the gas flow measurement market.
- We follow the flowmeter and energy markets on a quarterly basis through our *Market Barometer* and *Energy Monitor* publications

We create change in flow